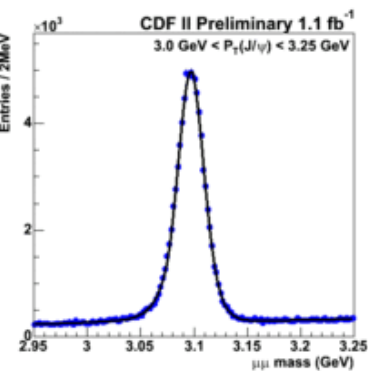


Nobel Prize 1976: Discovery of a “Heavy Elementary Particle of a New Kind” (J/ψ Meson)

Background:

- 1964: Quark Model proposed with three flavors: Up, Down, and Strange. Some authors theorize fourth quark.
- 1970: Sheldon Glashow, John Iliopoulos and Luciano Maiani credited with predicting fourth quark (“Charm”)
- 1974: Two groups, independent of each other, announce the discovery of the first “charmed” particle.



Left: Rather than much of a “hill”, a steeper “needle” was observed at 3.1 GeV

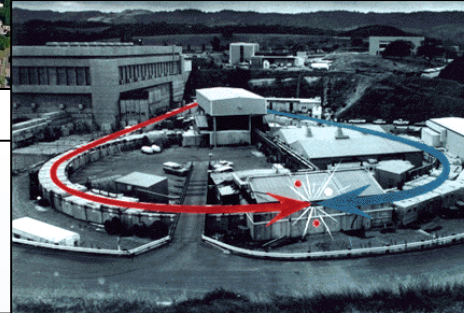
Experiments:

- Samuel Ting (Brookhaven National Lab): Used the RHIC (Relativistic Heavy Ion Collider) to search for heavy photons (vector mesons) through their decay into an e^+e^- pair.
- Burton Richter used e^+e^- collisions at SLAC to study the ratio of hadrons to muons produced in the collision. Allegedly, would not have been able to receive credit if Ting had not been so cautious and taken as long as he did to release his discovery.

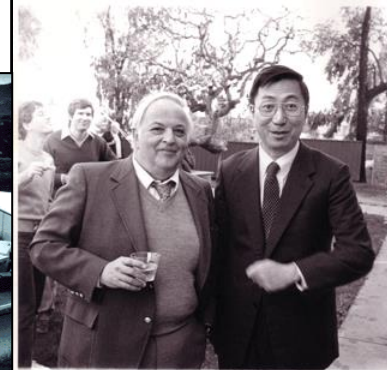


Above: A bird’s eye view of the RHIC

Below: Facilities used by Richter at SLAC



Below: Ting and Richter, 1984



Impact:

- Confirmed the existence of a fourth quark and paved the way for the discovery of the next quark: “Bottom” by Leon Lederman in 1977.
- The changes in HEP that followed this discovery were rapid and, along with the discovery, were coined the name “The November Revolution”.